

# THE GENUS *ABRONIA* (NYCTAGINACEAE) IN COLORADO, WITH NOTES ON *ABRONIA BOLACKII* IN NEW MEXICO

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## ABSTRACT

Several taxonomic observations on the genus *Abronia* in Colorado and New Mexico are presented. First, *Abronia argillosa* Welsh & Goodrich is a synonym of *A. glabrifolia* Standl. Second, *Abronia carletonii* Coult. & Fisher is a synonym of *A. fragrans* Nutt. ex Hook., and specimens of *A. carletonii* from New Mexico and Texas should be called *A. nealleyi* Standl. Third, *Abronia elliptica* is a species distinct from *A. fragrans*, as noted by several fruit and habit characteristics. Lastly, recognition of the newly described *A. bolackii* appears unwarranted and should be included in synonymy under *A. elliptica*. A distribution map of *Abronia* in Colorado is presented as well as photographs of fruits of each species.

## RESUMEN

Se presentan varias observaciones taxonómicas en el género *Abronia* en Colorado y Nuevo México. Primero, *Abronia argillosa* Welsh & Goodrich es un sinónimo de *A. glabrifolia* Standl. Segundo, *Abronia carletonii* Coult. & Fisher es un sinónimo de *A. fragrans* Nutt. ex Hook., y especímenes de *A. carletonii* de Nuevo México y Texas deben llamarse *A. nealleyi* Standl. Tercero, *Abronia elliptica* es una especie distinta de *A. fragrans*, como puede apreciarse por varias características del fruto y del hábito. Finalmente, el reconocimiento de la recientemente descrita *A. bolackii* parece injustificado y debería incluirse en la sinonimia de *A. elliptica*. Se presenta un mapa de distribución de *Abronia* en Colorado así como fotografías del fruto de todas las especies.

The Nyctaginaceae is a taxonomically complex family because of the heavy reliance upon mature fruit for identification (Galloway 2003; Welsh 2003). This is particularly true in the genus *Abronia*, where vegetative morphology can be highly variable within and among species while fruit morphology remains constant and distinct among taxa. The genus *Abronia* consists of 20 species, distributed throughout the Southwest, high Great Plains, Mexico, coastal California, and Pacific Northwest (Galloway 2003). Five species have been reported for the state of Colorado: *Abronia argillosa* Welsh & Goodrich, *A. carletonii* Coult. & Fisher, *A. elliptica* A. Nelson, *A. fragrans* Nutt. ex Hook., and *A. nana* S. Wats. var. *nana*. *Abronia bolackii* Atwood, Welsh & Heil is a newly described species endemic to San Juan County, New Mexico (Atwood et al. 2002).

*Abronia argillosa* is practically identical to *A. elliptica* vegetatively, and it is only through analysis of the fruit that identification can be made. Both species are perennial from a branching caudex with elliptic to ovate or suborbicular, entire leaves, and with white or purplish tinged flowers grouped in heads that are subtended by ovate to suborbicular bracts. However, *Abronia argillosa* has wingless fruit while *A. elliptica* has winged fruit with the wings dilated and inflated at the top (Fig. 1A,C). *Abronia argillosa* was described in 1980 (Welsh & Goodrich 1980) as a new species from Utah and Colorado restricted to Mancos Shale substrates. Examination of the original description of *Abronia glabrifolia* (Standley 1909) and the type specimen [Colorado: 1878, Wm. F. Flint s.n. (UC)] shows that this is clearly the same species. The type specimen of *A. glabrifolia* has the characteristic dark brown, wingless fruit with conspicuous white lines seen in the fruit of *A. argillosa* (Fig. 1C). The name *Abronia glabrifolia* predates that of *Abronia argillosa* by almost 70 years, and should thus be the name applied to all specimens of *A. argillosa*. William F. Flint was in Colorado at the Los Pinos Indian Agency in 1878 (Flint 1878), where he also collected a type specimen of *Senecio flintii* Rydb. [Colorado: S.W. Colorado, Wm. F. Flint s.n. (NY)]. Los Pinos was the name for the Ute Indian Agency, located about 25 miles north of Ouray and 11 miles south of Montrose, near the town of Eldredge (Young 1997), on what was then the reservation for the Uncompahgre Ute tribe. This locality is close to the Montrose-Ouray County line. Mancos Shale, the type of habitat known to support *A. glabrifolia* populations (Fig. 2), occurs in the vicinity.

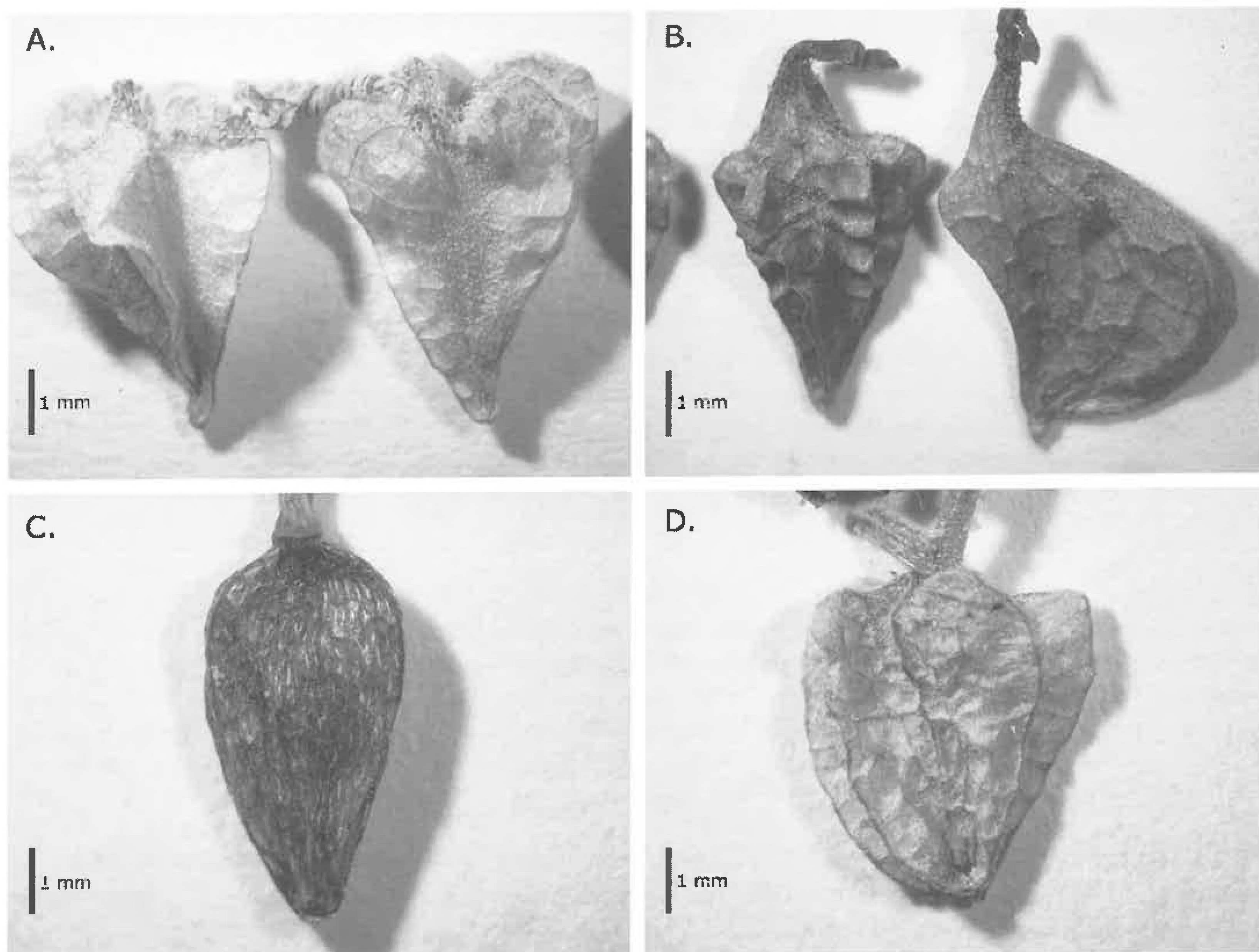


FIG. 1. *Abronia* fruit (taken at 10 $\times$ ). A. *A. elliptica* [Colorado: Montrose Co.: Paradox Valley, Colo 90, 0.6 mi E of MP 20j. 3.8 mi E of junction with River Road; gypsum outcrop on S side of road, 22 May 2004, Wm. F. Jennings s.n. (CS)]. B. *A. fragrans* [Colorado: Yuma Co.: 30 mi S of Wray, 4 Aug 1948, H.D. Harrington 4256 (CS)]. C. *A. glabrifolia* [Colorado: Garfield Co.: Wheeler Gulch, E end of Roan Plateau, 20 Jun 1981, P Nicholas 53 (CS)]. D. *A. nana* var. *nana* [Colorado: Mesa Co.: Sinbad Valley, right fork of the road, 1.9 mi to barren gypsum hill on the N side of road 29.00, 27 May 2005, Wm. F. Jennings s.n. (CS)].

The presence of *Abronia carletonii* in Colorado in particular has been questioned or misinterpreted by numerous taxonomists (Weber & Wittmann 2001). Assumption of its presence was based on the type collection made by Mark Carleton in 1891, and attributed to eastern Colorado. *Abronia carletonii* has not been collected in the state since, but is known to occur in New Mexico and Texas, where it is usually restricted to gypsum soil, very unlike the sandy soil that is found on the eastern plains of Colorado. Examination of the type specimen of *A. carletonii* [Colorado: Eastern Colorado, 1891, M.A. Carleton 459, (F)] confirms that it is actually a narrow-leaved, trailing form of *A. fragrans*. The fruit is winged, but the wings are not dilated and are thick and indurate as in typical *A. fragrans* (Fig. 1B). This form of *A. fragrans* is seen in other specimens from the plains growing in sandy soil [Colorado: Baca Co.: sand hills on south bank of Cimarron River, 31 Aug 1949, Weber & Anderson 5157 (KANU); Kansas. Finney Co.: ca. 2.5 mi S Garden City, scattered in sand dune area south of Arkansas River, 11 Sep 1989, Brooks & McGregor 19676 (KANU)]. In addition, the specimen was probably not collected in Colorado at all, but in extreme southwestern Kansas, just north of Elkhart, where the only *Abronia* known to be present is *A. fragrans*. The name *A. carletonii* should now be subsumed under *A. fragrans*, and specimens of *A. carletonii* in New Mexico and Texas should be referred to as *A. nealleyi* Standley, as suggested by Turner (2004).

In the Holzinger tabulation (Holzinger 1892), collection number 459 is not an *Abronia* at all, but is shown to be *Cnicus altissimus* and was collected in Kingfisher County, Oklahoma in August. The specimen

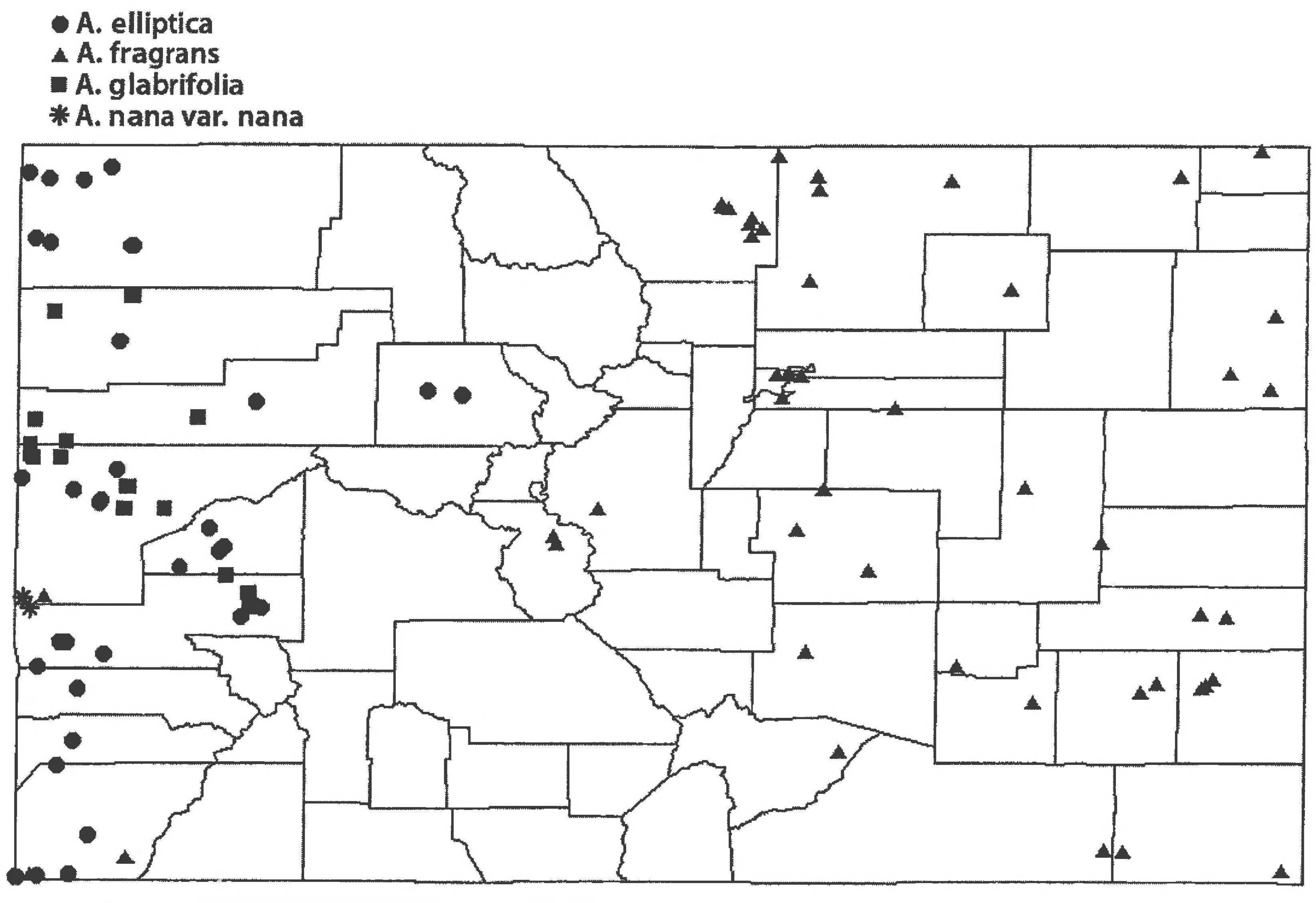


FIG. 2. Distribution of *Abronia* species in Colorado (based on herbarium specimens from CS and COLO). *A. elliptica* = circle; *A. fragrans* = triangle; *A. glabrifolia* = square; *A. nana* var. *nana* = star.

labeled collection number 459 of *Abronia carletonii* likely has the wrong label information, and is probably collection number 352 of *Abronia fragrans* collected in July in Morton County, Kansas, along the Cimarron River, probably near Point of Rocks north of Elkhart. According to Holzinger (1892), Carleton collected in Oklahoma, Kansas, and Texas, but not Colorado. Carleton began his collection trip in Oklahoma in June, collecting in the Cimarron Valley (collection numbers 202–235). He then continued north to Kansas where he collected until July (collection numbers 236–353), traveling across the southcentral counties of Comanche, Barber, Harper, and Sumner before going north to Sedgwick County. He continued westward from Wichita making collections in Reno and Stafford counties, and then in Seward, Stevens, and Morton counties in extreme southwestern Kansas. Carleton then traveled back to Oklahoma and Texas in July and August (collection numbers 354–474).

Some taxonomists consider *Abronia elliptica* to be synonymous with, or a variety of, *Abronia fragrans*. In particular, Welsh (2003) includes *A. elliptica* within a broad concept of *A. fragrans*. However, he misquotes Galloway (1975) as saying that the fruit of *A. elliptica* is 2-winged with a groove between the wings, and that of *A. fragrans* is 2–5-winged but not especially grooved. In fact, Galloway (1975) states that *A. elliptica* is 5-winged or 2-winged with the wings folded together, with dilated wing tops on the fruits that are not folded. Galloway (1975) further states that *A. fragrans* is deeply grooved or narrowly winged, with thick wings that are not inflated at the top. The fruits on the periphery of the heads in both *A. fragrans* and *A. elliptica* are often contorted, with 2 wings folded together, while the fruits in the middle of the head are 5-winged.

Careful analysis of the fruit as well as habit shows that *A. elliptica* and *A. fragrans* are indeed different species, as shown by the following characters. First, the fruit of *A. fragrans* is wingless or winged, with hard, rather indurate wings that are flat and lacking dilations (Fig. 1B). The fruit on the periphery of the heads is

often wingless in *A. fragrans* while within the central portion, fruits are winged. In contrast, *A. elliptica* has winged fruit with papery thin wings that are inflated and dilated at the top (Fig. 1A). Second, *A. fragrans* is generally a prostrate and spreading or semierect plant with more robust stems 3–5 mm wide, and with leaves that are ovate to triangular or lanceolate, especially on the upper part of the stem. *Abronia elliptica*, however, is generally erect or sometimes semierect with narrower stems typically 2–3 mm wide, with ovate to elliptic-oblong leaves. In addition, the distribution of *A. elliptica* in Colorado is scattered in the western counties. In contrast, *A. fragrans* is common on the eastern plains, but is also found in Chaffee County near Buena Vista. It is uncommon in the southwestern counties with a few records from Montezuma County and one from Mesa County (Fig. 2).

*Abronia nana* var. *nana* in Colorado is known only from gypsum outcrops in the Sinbad Valley in extreme western part of the state, on the Mesa-Montrose county line. This is the easternmost edge of its distribution range. It is a very distinctive species with acaulescent stems, and the entire plant is usually extremely viscid glandular. The fruit of *A. nana* var. *nana* is conspicuously viscid glandular and also winged. The five wings are broad, flat, and not dilated at the top (Fig. 1D).

*Abronia bolackii* Atwood, Welsh & Heil is a newly described species of *Abronia* endemic to gypsum soil in San Juan County, New Mexico (Atwood et al. 2002). It is delimited from *A. elliptica* based on the presence of rhizomes and fewer flowers per head (15–25 opposed to 25–75). However, the fruit and habit of *A. bolackii* are identical to that of *A. elliptica*. Specimens of *A. elliptica* with rhizomes have been collected as far north as San Juan County, Utah [Utah: San Juan Co.: E base of Comb Ridge just N of Hwy US 613, 1 Jun 1999, L. Yeatts 4251 (COLO)]. Richard Spellenberg (pers. comments) has also observed rhizomatous *A. elliptica* plants throughout its range from northcentral Arizona and northwestern New Mexico to northeastern Utah and southwestern Wyoming, including western Colorado. Welsh (2003) states that recognition of the occasional rhizomatous plants (of *A. elliptica*, included within his description of *A. fragrans*) at any taxonomic level seems unwarranted. In addition, several specimens of *A. elliptica* have as few as 19–24 flowers per head [Colorado: Moffat Co.: ca. 2.5 mi E of mouth of Irish Canyon, 7 Jun 1983, Baker & Kennedy 83-32 (CS); Colorado: Moffat Co.: Junction of Green and Yampa rivers, 8 Jul 1945, H.D. Harrington 1480 (CS); Colorado: Mesa Co.: Rabbit Valley, sandstone outcrop in sandy soil, 21 May 2004, Wm. F. Jennings s.n. (CS)]. Finally, the range of *A. bolackii* is well within the range of *A. elliptica*. Consequently, the status of *A. bolackii* as a species appears unjustified, and should be included in synonymy under *A. elliptica*.

The following key includes the common name, scientific name, synonyms (if applicable), ecology and/or distribution, elevation range, flowering time, and occurrence on the eastern or western slope of Colorado (designated by an E or W, respectively) for each species.

#### KEY TO THE SPECIES OF ABRONIA IN COLORADO

1. Plants acaulescent, usually caespitose from a much-branched woody caudex; fruit extremely viscid and sticky glandular, with 5 broad wings that are flat and not dilated; leaves to 2.5 cm in length, conspicuously viscid glandular \_\_\_\_\_ **A. nana** S. Wats. var. **nana**  
 DWARF SAND-VERBENA. Uncommon on gypsum outcrops in the Sinbad Valley, known in Colorado from Mesa and Montrose cos., 5400–5800 ft. Apr–May. W.
1. Plants caulescent, spreading and procumbent to erect; fruit unwinged or winged, dilated or flat, glabrous to villous or glandular at the top, but not conspicuously viscid; leaves 1.5–12 cm in length, glabrous to glandular, but not densely so.
  2. Fruit all wingless, dark brown to gray-brown with conspicuous small, appressed white lines but otherwise glabrous, and without a distinct reticulate vein pattern; flowers glabrous to sparsely glandular on the upper tube and lobes; bracts obovate to ovate or elliptic and rounded at the tips \_\_\_\_\_ **A. glabrifolia** Standl.  
 CLAY SAND-VERBENA. [= *A. argillosa* Welsh & Goodrich]. Found on clay soil of the Mancos Shale formation, known in Colorado from Garfield, Mesa, Montrose, and Rio Blanco cos., 4700–6800 ft. May–Jun. W.
  2. Fruit usually winged or sometimes wingless on the periphery of the head, white, greenish, or tan or brown, sometimes with appressed white lines but these not pronounced, usually villous and/or glandular especially at the top, with a conspicuous reticulate vein pattern throughout; flowers sparsely to densely glandular

throughout; bracts ovate to obovate or elliptic with rounded or more often acuminate or mucronate tips.

3. Fruit winged or unwinged, the wings not dilated distally but flattened, thick and indurate, the peripheral fruit often curved in side view; plants spreading and procumbent to semierect; leaves ovate to triangular or sometimes narrow and lanceolate on the upper part of the stem; bracts ovate to linear-lanceolate, with acuminate tips \_\_\_\_\_ **A. fragrans** Nutt. ex Hook.

FRAGRANT SAND-VERBENA. Found in sandy soil, especially common on the eastern plains, but also known from a few collections in the southwestern counties (Mesa and Montezuma), 3500–8000 ft. May–Aug(–Sep). E/W.

3. Fruit winged, the wings dilated (inflated) and expanded distally, thin and papery; plants erect or somewhat spreading; leaves ovate, elliptic, or sometimes orbicular; bracts ovate to obovate, with rounded or acuminate tips \_\_\_\_\_ **A. elliptica** A. Nels.

WESTERN SAND-VERBENA. Found on gypsum, clay, or sandy soil, known in Colorado from the western counties (Delta, Dolores, Eagle, Garfield, Mesa, Moffat, Montezuma, Montrose, Ouray, Rio Blanco, and San Miguel), 4500–6500(–8200) ft. Apr–Jun. W.

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